

# Evaluation of the Impact of the 2012 Rhode Island Health Care Worker Influenza Vaccination Regulations: Implementation Process and Vaccination Coverage

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**Context:** In October 2012, the Rhode Island Department of Health (HEALTH) amended its health care worker (HCW) vaccination regulations to require all HCWs to receive annual influenza vaccination or wear a surgical mask during direct patient contact when influenza is widespread. Unvaccinated HCWs failing to wear a mask are subject to a fine and disciplinary action. **Objective:** To describe the implementation of the 2012 Rhode Island HCW influenza vaccination regulations and examine their impact on vaccination coverage. **Design:** Two data sources were used: (1) a survey of all health care facilities subject to the HCW regulations and (2) HCW influenza vaccination coverage data reported to HEALTH by health care facilities. Descriptive statistics and paired *t* tests were performed using SAS Release 9.2. **Setting and participants:** For the 2012-2013 influenza season, 271 inpatient and outpatient health care facilities in Rhode Island were subject to the HCW regulations. **Main Outcome Measure:** Increase in HCW influenza vaccination coverage. **Results:** Of the 271 facilities, 117 facilities completed the survey (43.2%) and 160 facilities reported vaccination data to HEALTH (59.0%). Between the 2011-2012 and 2012-2013 influenza seasons, the proportion of facilities having a masking policy, as required by the revised regulations, increased from 9.4% to 94.0% ( $P < .001$ ). However, the proportion of facilities implementing Advisory Committee on Immunization Practices–recommended strategies to promote HCW influenza vaccination did not increase. The majority of facilities perceived benefits to collecting HCW

influenza vaccination data, including strengthening infection prevention efforts (83.2%) and improving patient and coworker safety (75.2%). Concurrent with the new regulations, influenza vaccination coverage among employee HCWs in Rhode Island increased from 69.7% in the 2011-2012 influenza season to 87.2% in the 2012-2013 season. **Conclusion:** Rhode Island's experience demonstrates that statewide HCW influenza vaccination requirements incorporating mask wearing and moderate penalties for noncompliance can be effective in improving influenza vaccination coverage among HCWs.

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Since 1984, the Centers for Disease Control and Prevention's (CDC's) Advisory Committee on Immunization Practices has recommended annual seasonal influenza vaccination for health care workers (HCWs).<sup>1,2</sup> Vaccinating HCWs against influenza can reduce influenza illness, staff absenteeism, transmission of influenza, and influenza-related morbidity and mortality among patients in health care settings.<sup>3-9</sup> Despite the documented benefits and Advisory Committee on Immunization Practices' long-standing recommendations, the overall influenza vaccination rate for HCWs has remained below the Healthy People 2020 target of 90% nationally.<sup>10</sup> With the notion that voluntary programs are insufficient to increase HCW influenza vaccination rates to the targeted levels, mandatory vaccination programs have been recently endorsed by many professional societies, state health departments, and other public health advocacy organizations.<sup>11-13</sup> Mandatory vaccination programs have successfully increased influenza vaccination coverage among HCWs in a variety of health care settings.<sup>10,14-17</sup>

In 2007, the Rhode Island Department of Health (HEALTH) required all health care facilities to offer influenza vaccine at no cost to their workers, provide education on influenza illness and the safety of influenza vaccine, and report HCW influenza vaccination coverage to HEALTH.<sup>18</sup> Despite these requirements, influenza vaccination coverage for HCWs in Rhode Island increased only marginally for several years, reaching less than 70% in the 2011-2012 influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2012).

In October 2012, to further increase influenza vaccination coverage among HCWs, HEALTH amended the 2007 regulations to include stricter requirements for HCWs who choose to remain unvaccinated (referred to here as "the HCW regulations").<sup>19</sup> The amended regulations require all HCWs to either receive influenza vaccination or provide a proof of medical exemption or a declination statement to their health care facilities by December 15th of each year. Unvaccinated workers in facilities must wear a surgical face mask during direct, face-to-face contact with patients when influenza is declared widespread. Unvaccinated HCWs who fail to comply with the mask-wearing requirement are subject to a \$100 fine for each violation and possible disciplinary action by their licensing board.<sup>19</sup> In the regulations, a HCW is defined as any person who is temporarily or permanently employed or serves as a volunteer in a health care facility and who has or may have direct contact with a patient in the facility. A health

care facility is defined as any institutional health service provider or facility that is licensed by HEALTH, including but not limited to hospitals, nursing homes, home care providers, home nursing care providers, kidney disease treatment centers, and hospice providers.<sup>19</sup>

The HCW regulations became effective on October 25, 2012, as the 2012-2013 influenza season was starting; influenza was declared widespread in Rhode Island on December 5, 2012.<sup>20</sup> To assess effectiveness of the new mandatory vaccination regulations, HEALTH conducted both qualitative and quantitative evaluations in collaboration with CDC. This report presents results of the quantitative evaluation; the qualitative evaluation is presented elsewhere.<sup>21</sup> This evaluation examined (1) the processes/methods used by health care facilities to implement the HCW regulations and (2) the impact of the regulations on HCW influenza vaccination coverage during the 2012-2013 influenza season.

## ● Methods

### Data

Data were analyzed from 2 sources: (1) an evaluation survey of health care facilities conducted by HEALTH (facility evaluation survey) and (2) HCW influenza vaccination data reported to HEALTH by health care facilities (HCW influenza vaccination report).

#### *Facility evaluation survey*

The survey was conducted to evaluate how health care facilities implemented the HCW regulations during the 2012-2013 influenza season. The target of the evaluation survey was all health care facilities subject to the HCW regulations for the 2012-2013 influenza season ( $n = 271$ ). A comprehensive list of facilities was obtained from HEALTH's Office of Facility Regulation. HEALTH identified a contact person considered most appropriate to respond to the survey in each facility, usually the person who reported HCW influenza vaccination data to HEALTH. A link to the survey was e-mailed to the contact person with a letter from the director of HEALTH, requesting his or her participation in the survey. The survey data were collected from August 19 to September 12, 2013, through HEALTH's Web-based survey system.

#### *HCW influenza vaccination report*

The aggregate counts of HCW influenza vaccination status reported by health care facilities to HEALTH were used to estimate vaccination coverage. The elements of data reporting include HCW influenza vaccination status (vaccinated, medical exemption,

declination, and unknown status) for employees, nonemployee licensed independent practitioners (LIP), and nonemployee adult students/trainees/volunteers (STV). These elements were adapted from the National Healthcare Safety Network's Healthcare Personnel Influenza Vaccination Summary Measure.<sup>22</sup> For the 2012-2013 influenza season, all health care facilities were required to report their data during April-May 2013 through a Web-based reporting system.

### Survey instrument

The survey questions were adapted from data collection instruments and CDC recommendations used in previous evaluations about HCW influenza vaccination.<sup>23-25</sup> In addition, several questions specific to Rhode Island were developed by the evaluation team and included in the survey, which yielded the 20-item questionnaire. The survey took 15 to 20 minutes to complete and included topics such as facility policies on HCW influenza vaccination, strategies used to promote vaccination, and perceived benefits of collecting data on influenza vaccination of HCWs. Some questions asked respondents to compare the experience of the 2012-2013 influenza season with the 2011-2012 influenza season. The project was reviewed by human subjects' representatives from CDC and HEALTH and determined to be public health nonresearch not requiring institutional review board review.

### Statistical analyses

#### Survey data

The unit of analysis was the health care facility. Descriptive analyses were conducted, and paired *t* tests were employed to examine differences between the 2011-2012 and the 2012-2013 influenza seasons in facility policies and vaccination promotion strategies. Facilities were divided into 2 groups on the basis of their employee size. A small facility was defined as having an employee size of 100 or less and a large facility was defined as having employee size of more than 100. When the prevalence was examined by employee size (small facilities vs large facilities),  $\chi^2$  tests were employed. When the cell size was less than 5, Fisher exact test results were presented. *P* values less than .05 were considered statistically significant. All statistical analyses were conducted using SAS Release 9.2.<sup>26</sup>

#### Vaccination report data

The rates of vaccination, medical exemption, declination, and unknown status were calculated on

the basis of the instructions of the National Healthcare Safety Network Manual.<sup>22</sup> The 2012-2013 influenza season data were compared with those of the 2011-2012 influenza season when the data could be compared.

## Results

Of the 271 facilities subject to the HCW regulations, 137 (50.6%) responded to evaluation survey. Twenty facilities that answered only demographic questions were excluded from analyses, leaving a final analytic number of 117 facilities (43.2%). Of the 117 facilities, about half (49.1%) had an employee size of 100 or less, and almost all facilities (97.3%) reported HCW influenza vaccination data to HEALTH during the 2012-2013 influenza season (see Supplemental Digital Content 1 Table, available at <http://links.lww.com/JPHMP/A101>, which describes the characteristics of facilities responding to evaluation survey).

### Facility's implementation of HCW regulations

The first 3 items in Table 1 measure how health care facilities implemented the HCW regulations. Although almost all facilities responding to the survey (96.6%) applied HCW regulations on vaccination and masking to their employees, fewer facilities applied the regulations to their nonemployees. Compared with small facilities, large facilities were more likely to apply the regulations to both employees and all types of nonemployees.

During widespread influenza, facilities required mask wearing for unvaccinated HCWs under different circumstances. Nearly two-fifths of facilities (39.7%) required mask wearing any time the HCW might have face-to-face patient contact (including at registration), and one-third of facilities (33.6%) required it any time the HCW was in a patient care area/patient care unit. Twelve percent required masking only when the HCW was providing clinical care (ie, within 6 ft of a patient), and 11.2% required it any time the HCW was inside any part of the facility.

The majority of facilities reported that the supervisors of HCWs were responsible for verifying mask compliance (69.9%), and more than one-half of facilities (56.6%) reported that each unvaccinated HCW was responsible for wearing his or her mask.

### Perceived benefits of collecting data on HCW influenza vaccination

The last item in Table 1 presents perceived benefits of collecting HCW influenza vaccination data. The most

**TABLE 1 • Facility's Implementation of HCW Regulations and Perceived Benefits of Collecting HCW Influenza Vaccination Data, Overall and by Facility Size, 2012-2013 Influenza Season<sup>a</sup>**

	All Facilities, n (%)	By Facility size		P <sup>b</sup>
		Small Facilities, n (%)	Large Facilities, n (%)	
To which of the following groups did this facility apply the new HCW regulations on vaccination and masking of HCWs? <sup>c</sup>				
Employees	113 (96.6)	53 (93.0)	59 (100.0)	<.05
Nonemployees (licensed independent practitioners)	78 (66.7)	30 (52.6)	47 (79.7)	<.01
Nonemployees (adult students and trainees)	60 (51.3)	19 (33.3)	40 (67.8)	<.01
Nonemployees (adult volunteers)	62 (53.0)	14 (24.6)	47 (79.7)	<.01
During widespread influenza, under what circumstances were unvaccinated HCWs at this facility required to wear masks?				
Any time the HCW was inside any part of the facility	13 (11.2)	7 (12.5)	6 (10.2)	NS
Any time the HCW was in a patient care area/patient care unit	39 (33.6)	15 (26.8)	24 (40.7)	
Any time the HCW might have face-to-face patient contact (including at registration)	46 (39.7)	23 (41.1)	22 (37.3)	
Only when the HCW was providing clinical care (ie, within 6 ft of a patient)	14 (12.1)	8 (14.3)	6 (10.2)	
Not applicable: all HCWs in this facility received influenza vaccination	2 (1.7)	1 (1.8)	1 (1.7)	
Not applicable: unvaccinated HCWs in this facility did not have to wear a mask	2 (1.7)	2 (3.6)	0 (0.0)	
How did this facility make sure that unvaccinated HCWs were wearing masks when required? <sup>c</sup>				
Each unvaccinated HCW was responsible for wearing his or her mask	64 (56.6)	31 (56.4)	33 (57.9)	NS
Peers/coworkers of HCWs were responsible for verifying mask compliance	18 (15.9)	6 (10.9)	12 (21.1)	NS
Supervisors of HCWs were responsible for verifying mask compliance	79 (69.9)	34 (61.8)	44 (77.2)	NS
Checked identification badge for quick verification of vaccination	19 (16.8)	6 (10.9)	13 (22.8)	NS
Not applicable; unvaccinated HCWs in this facility did not have to wear a mask	2 (1.2)	2 (3.6)	0 (0.0)	NS
What do you believe are the benefits of collecting data on influenza vaccination of HCWs in this facility? <sup>c</sup>				
Helps increase vaccination promotion efforts at facility	80 (70.8)	32 (58.2)	47 (82.5)	<.01
Helps improve HCW tracking system	65 (57.5)	31 (56.4)	34 (59.6)	NS
Provides data for The Joint Commission reporting requirements	37 (32.7)	11 (20.0)	26 (45.6)	<.01
Provides data for health care facility administration/system reporting requirements	71 (62.8)	30 (54.5)	41 (71.9)	NS
Strengthens infection prevention efforts	94 (83.2)	41 (74.5)	52 (91.2)	<.05
Helps improve patient and coworker safety	85 (75.2)	43 (78.2)	42 (73.7)	NS
Communicates vaccination rates to HCWs at facility	50 (44.2)	15 (27.3)	35 (61.4)	<.01
No benefit	4 (3.5)	3 (5.5)	1 (1.8)	NS

Abbreviations: HCW indicates health care worker; NS, not significant.

<sup>a</sup>From Facility Evaluation Survey conducted by HEALTH during August 19 to September 12, 2013.<sup>b</sup>P values are from the  $\chi^2$  test; P < .05 is presented in bold.<sup>c</sup>Each response category is treated as a separate question.

frequently reported benefits were that it strengthens infection prevention efforts (83.2%), helps improve patient and coworker safety (75.2%), and helps increase vaccination promotion efforts at the facility (70.8%). Respondents from large facilities were more likely to report benefits of collecting data than respondents from small facilities for several aspects: collecting data helps increase vaccination promotion efforts at the facility; it helps provide data for The Joint Commission reporting requirements; it strengthens infection prevention efforts; and it helps communicate vaccination rates to HCWs at the facility.

### Facility's policy on HCW influenza vaccination

The first item in Table 2 presents facilities' policy on HCW influenza vaccination. Between the 2011-2012 influenza season (before new regulations) and the 2012-2013 influenza season (after new regulations), the proportion of facilities requiring unvaccinated HCWs to wear a mask during patient care activities increased dramatically from 9.4% to 94.0% ( $P < .01$ ). The increase was observed in both small and large facilities. In the 2012-2013 influenza season, compared with prior season, more facilities required HCWs who declined vaccination to undergo additional education on influenza disease and vaccination (23.9% vs 43.6%;  $P < .01$ ), required them to meet with a disciplinary committee or a supervisor (3.4% vs 20.5%;  $P < .01$ ), did not permit them to work at the facilities (5.1% vs 16.2%;  $P < .01$ ), and assigned them to different units or job duties during widespread influenza (0% vs 6.8%;  $P < .01$ ).

Although the proportion of facilities allowing medical exemptions remained similar between the 2 influenza seasons, fewer facilities allowed religious or personal belief exemptions in the 2012-2013 influenza season (38.5%), compared with the 2011-2012 influenza season (50.4%).

### HCW influenza vaccination promotion strategies

The last item in Table 2 shows strategies used to encourage HCWs to receive the influenza vaccine. Overall, of the 11 promotion strategies reviewed, only 1 strategy was used by more facilities following implementation of the new regulations: the percentage of facilities providing education to staff who reported that they were challenged by the facility's influenza vaccination policy increased significantly from 34.5% in the 2011-2012 influenza season to 65.5% in the 2012-2013 influenza season ( $P < .01$ ). Although the percentages increased significantly in both small and large facilities, the amount of increase was greater in large facilities (38.6 percentage points) than in small facilities (23.6 percentage points).

For small facilities, many vaccination promotion strategies were less likely to be used in the 2012-2013 influenza season than in the 2011-2012 flu season. Fewer small facilities provided free vaccination to HCWs (83.6%-67.3%;  $P < .05$ ); used mobile vaccination carts (10.9%-1.8%;  $P < .05$ ); provided vaccination in wards, clinics, cafeterias, or common areas (34.5%-23.6%;  $P < .05$ ); provided vaccination during nights and weekends (38.2%-23.6%;  $P < .05$ ); provided visible vaccination of key personnel (38.2%-25.5%;  $P < .05$ ); and provided education on the benefits and risks of vaccination (83.6%-65.5%;  $P < .01$ ). However, use of those strategies did not change significantly in large facilities between the 2011-2012 and 2012-2013 influenza seasons.

### HCW influenza vaccination coverage

Of the 271 facilities subject to the HCW regulations, 160 facilities (59.0%) reported their HCW influenza vaccination data to HEALTH in the 2012-2013 influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2013), a notable increase from 73 facilities (26.9%) in the 2011-2012 influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2012). The Figure shows that of the 160 facilities, all reported having 1 or more employee HCWs in their facility, 105 facilities (65.6%) reported having 1 or more nonemployee LIP, and 80 facilities (50.0%) reported having 1 or more nonemployee STV during the influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2013).

The proportion of HCWs who received influenza vaccination varied by HCW type: 87.2% of employee HCWs, 81.6% of nonemployee LIPs, and 56.1% of nonemployee STVs were vaccinated. The large coverage differences among HCW types were mainly due to differences in the proportion of unknown vaccination status of each group. Whereas only 2.1% of employee HCWs had unknown vaccination status, 14.6% of LIPs and 40.0% of STVs had unknown status.

Overall, influenza vaccination coverage among employee HCWs in Rhode Island increased from 69.7% in the 2011-2012 influenza season to 87.2% in the 2012-2013 influenza season. Specifically, vaccination coverage for employee HCWs increased from 74% to 88.6% in hospitals, from 60% to 90.6% in nursing homes, and 55% to 71.2% in home nursing care providers (data not shown) (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2012; State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2013). However, due to large missing data of nonemployee HCWs,



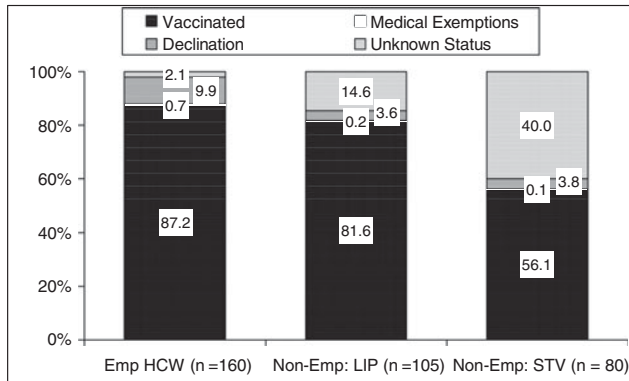
**TABLE 2 • Facilities Having Policies for HCW Influenza Vaccination and Using Strategies to Promote HCW Influenza Vaccination, Overall and by Facility Size, 2011-2012 Influenza Season Versus 2012-2013 Influenza Season<sup>a</sup>**

	By Facility Size					
	All Facilities			Small Facilities		
	2011-2012 Season, n (%)	2012-2013 Season, n (%)	P <sup>b</sup>	2011-2012 Season, n (%)	2012-2013 Season, n (%)	P <sup>b</sup>
Facility policy for HCW influenza vaccination <sup>c</sup>						
Unvaccinated HCWs are required to wear a mask during patient care activities when influenza is widespread	11 (9.4)	110 (94.0)	<.01	8 (14.0)	51 (89.5)	<.01
HCWs who decline vaccination are required to undergo additional education on influenza disease and vaccination	28 (23.9)	51 (43.6)	<.01	15 (26.3)	21 (36.8)	NS
HCWs who decline vaccination are required to meet with a disciplinary committee or a supervisor	4 (3.4)	24 (20.5)	<.01	4 (7.0)	14 (24.6)	<.05
HCWs who decline vaccination and do not have an exemption are not permitted to work at the facility	6 (5.1)	19 (16.2)	<.01	3 (5.3)	11 (19.3)	<.05
HCWs who decline vaccination are assigned to different units or job duties during periods of widespread influenza	0 (0.0)	8 (6.8)	<.01	0 (0.0)	6 (10.5)	<.05
Medical exemptions to vaccination are allowed	81 (69.2)	82 (70.1)	NS	34 (59.6)	31 (54.4)	NS
Religious or personal belief exemptions to vaccination are allowed	59 (50.4)	45 (38.5)	<.05	24 (42.1)	21 (36.8)	NS
Facility does not have a formal influenza vaccination policy for HCWs	6 (5.1)	6 (5.1)	NS	4 (7.0)	5 (8.8)	NS
Strategies used to encourage HCWs to receive the influenza vaccine <sup>c</sup>						
Provide free vaccination to HCWs	96 (85.0)	87 (77.0)	NS	46 (83.6)	37 (67.3)	<.05
Use mobile vaccination carts	32 (28.3)	26 (23.0)	NS	6 (10.9)	1 (1.8)	<.05
Provide vaccination in wards, clinics, cafeterias, or common areas (eg, teams of qualified persons administered vaccinations)	56 (49.6)	53 (46.9)	NS	19 (34.5)	13 (23.6)	<.05
Provide vaccination during nights and weekends	57 (50.4)	52 (46.0)	NS	21 (38.2)	13 (23.6)	<.05
Provide vaccination at any meetings (grand rounds, in-service, staff meetings, etc)	41 (36.3)	36 (31.9)	NS	16 (29.1)	11 (20.0)	NS
Provide visible vaccination of key personnel	46 (40.7)	39 (34.5)	NS	21 (38.2)	14 (25.5)	<.05
Provide education on the benefits and risks of vaccination	97 (85.8)	88 (77.9)	NS	46 (83.6)	36 (65.5)	<.01
Provide education to staff who believed that they were challenged by the new policy	39 (34.5)	74 (65.5)	<.01	19 (34.5)	32 (58.2)	<.01
Track unit- or department-specific vaccination rates for some areas	38 (33.6)	32 (28.3)	NS	10 (18.2)	5 (9.1)	NS
Provide feedback of vaccination rates to facility administration	73 (64.6)	66 (58.4)	NS	30 (54.5)	23 (41.8)	NS
Provide incentives for vaccination (candy, entry into raffle or prize drawing, time off, etc)	21 (18.6)	23 (20.4)	NS	5 (9.1)	4 (7.3)	NS
None of the above	1 (0.9)	2 (1.8)	NS	1 (1.8)	1 (1.8)	NS

Abbreviations: HCW indicates health care worker; NS, not significant.

<sup>a</sup>From Facility Evaluation Survey conducted by HEALTH during August 19 to September 12, 2013.<sup>b</sup>P values are from the paired t test (before and after); P < .05 is presented in bold.<sup>c</sup>Each response category is treated as a separate question.

**FIGURE ● HCW Influenza Vaccination Coverage by HCW Type, Rhode Island, 2012-2013 Influenza Season<sup>a</sup>**



Abbreviations: HCW, health care worker; LIP, licensed independent practitioner (physician, advanced practice nurse, and physician assistant); STV, adult student, trainee, and volunteer.

<sup>a</sup>From HCW influenza vaccination report submitted by health care facilities during April-May 2013.

vaccination coverage for LIPs and STVs could not be accurately compared between the 2 influenza seasons.

## ● Discussion

To our knowledge, Rhode Island is the first US state to mandate comprehensive, statewide annual influenza vaccination for HCWs.<sup>27-29</sup> Fifteen other states have enacted laws pertaining to HCW influenza vaccination administration, but the laws vary in their scope and types of health care settings covered.<sup>30</sup> Most states apply the laws to only certain health care settings or HCW types (eg, only hospitals or only employee HCWs) or have permissive laws that do not impose strict penalties for noncompliance.<sup>30-34</sup> Currently, Colorado and New York have state laws requiring unvaccinated HCWs to wear surgical masks,<sup>30</sup> but neither of these laws predated Rhode Island's law. In addition to the masking requirement, the Rhode Island regulations specify that "Unvaccinated HCWs who violate the masking requirement are subject to a \$100 fine per violation and disciplinary action. The \$100 fine is not payable to the facility. It will be levied only after a complaint is filed with HEALTH, investigated, referred to the appropriate licensing board, and after an opportunity for a hearing. If the fine is levied, it will be payable to the General Treasurer."<sup>19,35</sup> However, in the 2012-2013 influenza season, no complaints were filed with HEALTH, and no fines were collected.

The most successful outcome of the HCW regulations in Rhode Island was that overall influenza vaccination coverage for employee HCWs increased 17.5 percentage points among reporting facilities,

from 69.7% in the 2011-2012 influenza season to 87.2% in the 2012-2013 influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2012; State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2013). Although vaccination coverage increased in all types of health care settings, the coverage increased particularly among HCWs in nursing homes, where influenza vaccination coverage had been traditionally low in Rhode Island as well as nationally (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2012).<sup>10</sup> Rhode Island achieved more than 90% coverage among employee HCWs at reporting nursing homes during the 2012-2013 influenza season (State of Rhode Island and Providence Plantations Department of Health, unpublished data, 2013). Since nursing homes are regularly inspected and assessed by HEALTH, the new regulations may have increased the facilities' awareness of the importance of HCW influenza vaccination. For hospitals, the vaccination coverage in Rhode Island also increased significantly after enacting the HCW regulations, although the magnitude of increase was somewhat smaller than for nursing homes. These results are contrasted with the experience of California's 2006 influenza vaccination requirements for hospital-based HCWs, which did not increase influenza vaccination uptake.<sup>34,36</sup> The different outcomes may be due to differences in the regulations: while Rhode Island regulations require unvaccinated HCWs to submit signed declination statements and to wear masks during periods of widespread influenza,<sup>19</sup> California law requires only signed declination statements for unvaccinated HCWs.<sup>34,36</sup> In addition, Rhode Island regulations include specific penalties for non-compliance, which are absent in California's law.<sup>19,34,36</sup>

The most noticeable change between the 2011-2012 and the 2012-2013 influenza seasons was the increase in the number of facilities having a masking policy for unvaccinated HCWs. This is possibly due to the fact that facilities are required by the regulations to have masking policies in place and enforce them when influenza is declared widespread. However, the enforcement of masking among unvaccinated HCWs was identified as a major barrier for facilities to implement the HCW regulations, because it "required timely tracking of vaccination status and additional time and effort from supervisors."<sup>21</sup> To better implement masking requirements in the future, it is recommended that all facility administrators clearly communicate the masking requirement to their HCWs while requiring them to receive vaccination by December 15.

It is interesting to note that most strategies promoting influenza vaccination among HCWs<sup>25</sup> were less likely to be used in the 2012-2013 influenza season

than in the 2011-2012 influenza season, particularly in smaller facilities. A similar pattern was found in California after enacting the influenza vaccination requirements for hospital personnel: California hospital-based HCWs were less likely than HCWs in states without vaccination requirements to report employer policies to promote vaccination using incentives and rewards.<sup>36</sup> As suggested by California's experience, by focusing on compliance with the requirements, such as data collection and tracking, reporting, masking, and education, small facilities might have unintentionally reduced their efforts to implement other voluntary promotion strategies.<sup>36</sup>

There are several limitations to this study. Only 43.2% of facilities completed the evaluation survey, and nearly all respondents reported HCW vaccination data to HEALTH. Therefore, results may not describe the experience of nonreporting facilities and may not be generalizable to all facilities in Rhode Island. Since evaluation survey data could not be linked to reported vaccination coverage because of the anonymity of the survey, relationships between vaccination coverage levels and facility policies/promotion strategies could not be examined. Data on vaccination coverage and survey information used for this study were all self-reported and not verified by HEALTH. While data regarding employee HCW influenza vaccination status were highly complete and accurate, data on nonemployee HCWs had a large proportion of unknown status, which is also reported in a national study.<sup>23</sup>

Although HEALTH worked meticulously with health care facilities well in advance to prepare for implementing the HCW regulations, not all facilities submitted their HCW influenza vaccination summary data to HEALTH. Failure to report could be due to confusion on which facilities were covered by the regulations, inability to enforce requirements, and lack of resources in HEALTH to reach out to all facilities individually. For future years, HEALTH plans to clarify the definition of reporting elements, strengthen the facilities' reporting obligations, and follow up with nonreporting facilities. In conclusion, although Rhode Island's first-year experience of implementation of the regulations was not perfect, our data demonstrate that statewide HCW influenza vaccination requirements incorporating mask wearing and moderate penalties for noncompliance may be effective in improving influenza vaccination coverage among HCWs.

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